THE INTEGRATION OF SIMULATION IN DEVELOPMENT OF NURSES' COMPETENCIES IN NATURAL DISASTER SITUATION

(A Scoping review)

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Abstract:

Nurses preparedness and competencies are of paramount importance in disaster situations. The adverse effect of both natural and man-made disasters is alarming all over the globe, a myopic knowledge cannot deal with the myriad of these disasters rather an in-depth knowledge, skills and competencies are essential to combat them. This research work seeks to examine how simulation studies are being applied in natural disaster situations and how useful simulation studies are in enhancing nurses' knowledge and their competences in disaster situations. A scoping literature review methodology was used to examine a final number of 13 articles from previous 201 research papers available between year (2012-2017) after duplicated articles were discarded. Data compiled from these articles were classified based on: authors, years, area of focus and collating, summarizing & results reporting. The results extracted from the final data were analyzed by highlighting certain similarities, making comparisons, assertions, and conclusions. Results indicate that, Simulation can be cost effective approach to minimized and prepared for disasters, as well as means of improving nurses' competencies in disaster situations. The research question; can simulation improve nurses' competencies in natural disaster situations was answered in affirmative.

Keywords:	Natural disasters, Nursing, Simulation training, Competencies, Disaster nursing
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Table of Contents

List of tables

List of figures

FOREWORD

In the name of God, the most beneficient, the most merciful. All praises, adorations, glorifications are due to Almighty God the lords of the worlds. May His infinite mercy continue to be on the best of mankind (PBUH), his household, his companions and all his followers until the day of accountablity.

My utmost gratitude goes to my mum, I cannot thank you enoug, May Almighty God continue to bless you (Amin) and my to my beloveth Dad, I pray Almighty God forgive you all your shortcomings and put you into the best of paradise (Amin) . My gratitude to my family and my lovely wife, may Almighty God continue to guide and strengthen us (amin).

Special thanks to Dr. Heikki Paakkonen and Marketta for your guidance throughout my thesis, am really grateful and to all the teachers throughout my studies, thank you so much. Thanks to my collegues, you guys are super amazing and I am very lucky to be amongst you.

Finally, to all my friends and relatives out there, thanks for your endless support, I wish you all the very best in life.

BABATUNDE TIJANI

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1 INTRODUCTION

One of the most devastating problems confronted by mankind since the beginning of time are disasters, either natural disasters or man-made disasters. A myopic knowledge cannot combat the challenges faced due to the occurrence disasters, rather an in-depth knowledge and preparedness towards disaster prevention is imperative to limit the adverse effect of disasters to a country and the entire world at large. It is of vital importance for health care personnel and students to be exposed to disaster preparedness as part of their curriculum and day to day practices, hence, it develops their competencies in disaster situation. (Stanely & Bennecoff, 2015).

Disaster has been in existence since the beginning of time and will continue to exist irrespective of any country's development. It is quite unfortunate that disasters are inevitable, although lots of efforts have been made towards disaster mitigation and preventions, disasters still occur and will continue to occur. However, studies have shown that developing countries are more vulnerable to disasters due to poor or lack of disaster preparedness. (Gaba, 2007).

There is no agreed upon definition of disaster, but disaster can be defined as any catastrophic occurrence that disturbs the normal functioning of a country or society, there by leading the country or community to seek help from an outside source. The impact of any disaster is always devastating, and it could lead to loss of lives, injuries, loss of properties, shortage of electricity supply, infrastructures, etc. Disaster can come in a small or large scale, knowledge, awareness and attitudes are some of the keys towards achieving a good preparedness. (Powers and Daily, 2010).

With good disaster preparedness, the situations of any disaster can be effectively minimized. Disasters are increasing at all levels (local, national and globally) and these have increased the needs of communities and nurses to be well prepared. Unfortunately, however, there has been decreased in fund for disaster preparedness since 2003, which has led to fewer opportunities for emergency management agencies and public health sector to test disaster response plans. It is therefore imperative for fresh graduating nursing students to have in-depth knowledge and training on disaster nursing and to

know how to effectively manage the immense detrimental effect of disasters in both national and global context. (Rafferty-Semon, Jarzembak & Shanholtzer, 2017).

Gaba (2007) defines competencies as the applied skills and knowledge that enable people to do their work. In order words, nurses' competencies are those skills, training and knowledge that enable nurses to do their jobs effectively. The rate of performance that illustrates the skills, knowledge and judgment of a person can be said as competence. Competencies can be achieved through education, work experiences, training and practices.

Learning experiences for emergency training and disaster preparedness includes; virtual reality, inter-professional education, online gaming and simulation. Simulation practices have really helped in the development of knowledge, skills and attitudes, it also provides the opportunities to analyze and respond to real-life situation. Simulation-based training is one of the fast-growing methods that have been used within emergency and disaster management to achieve the required knowledge, skills and experience. (Rafferty-Semon et al., 2017).

According to (Gaba, 2007) there are 11 dimensions in which the diverse applications of simulation in healthcare can be categorized: aims and purposes of the simulation activity; unit of participation; participants' professional discipline; type of knowledge, skill, attitudes, or behaviours addressed; healthcare domain; participants' level of experience; the age of the simulated patient; applicable or required technology; site of simulation; extent of direct participation; and method of feedback used.

Simulation is one of the most effective techniques used for preparedness and combating the myriad of disasters occurrence, it allows nurses to transform disaster nursing from a hypothetical situation to a more realistic situation. Simulation can be defined as a training technique used to replicate a real-life situation with the help of guided experiences and expertise. This technique is often useful to help in the development of competencies and preparedness. Nowadays, there have been increasing interests in the use of simulation to improve patient safety and care. (Gaba, 2007).

There is a growing body of evidence that shows how simulation training is important for effective disaster response, and for a rapid and correct decision-making process in the moment of stress. Disaster is not a normal every day activities, which means that daily activities alone cannot be sufficient to provide the necessary experience needed to manage such large-scale events. (Jonson, Pettersson, Rybing, Nilsson & Prytz, 2017).

2 LITERATURE REVIEW

Disaster affects relatively large numbers of people every year causing loss of lives, injuries, damage of properties, infrastructures etc. However, some disasters can be avoided or minimized by reducing the risk factors that causes them. The development of any country can be immensely affected by disaster, some places have more potential of been affected by some disaster than other, this could be due to their geographical location, natural habitat or the life styles of the people in the habitat. The unfortunate truth is that, regardless of the development or wealth of any nation, no nation is fully immune to the negative effect of disasters, however, some countries are more effective in addressing the problem than others. (Coppola, 2006).

In disaster situations, nurses need to be more focus on the treatment that would benefits the affected population rather than individual care. Effective care should aim at saving the highest number of people within the shortest amount of time while allocating scarce resources effectively. The World Health Organization and American Association of Colleges of Nursing recommend the integration of disaster response training in nursing curriculums nationally and internationally to improve the confidence and competency level of nursing students in disaster preparedness and response. (Strout, 2017).

Alfred et al. (2015) states that, to achieve the global need for effective disaster response, first responders must possess the necessary skills, education and have a certain ethical responsibility to assist. Nurses are consistently described as reliable responders due to their education and compassionate care. Historically, nurses are linked to the provision of care during disaster and often, they are the first and most active health care provider during disaster irrespective of how huge or little the impact of the disaster. The significant role of nurses during disasters have been in existence since the time of Florence Nightingale when she provided care to the injured and ill during the Crimean War and up to date, nurses are the most active players in disaster situations. (Tzeng et al. 2016).

In addition, nurses might sometimes need to take a leadership role which is an integral part of nursing curriculum, it is not an option in nursing field, rather it is required to

effect change (Stanely & Bennecoff, 2015). Any disaster situation is difficult to cope with, mostly when providing care in a situation where it is not convenient and with limited number of resources. Nurses' skill, ability, critical thinking and problem solving are very essential in such situation to provide compassionate care that would be more beneficial to the affected population rather than individual. The main objective of disaster response is not to provide individual care, rather care that would benefit the affected populace. (Powers and Daily, 2010).

Nurses might sometimes be called upon spontaneously to take care of enormous number of patient at a very limited amount of time, without appropriate planning, the delivery of care might not be effective. A triage method, proper distribution of nurses available, coordinating, appropriate distribution of equipment and balancing between legal right and ethical issues are very important and challenging task to achieve, without a good competency skill, the tasks are impossible to attain. It is therefore essential for health care providers to be well equipped with the essential knowledge and skills, knowing how to respond, recover and even formulate a new plan if need be, in a disaster situation. (Powers and Daily, 2010).

Disaster nursing competency can be categorized into 3 phases; the pre-event, which ensures nurses possess the relevant knowledge, training and capabilities in identifying risks factors, response plans and preparedness for all kind of disasters before they occur. The second phase is the Intra-phase, this ensures nurses have the physical, psychological and holistic care competence for the affected population, while the last phase is the post-disaster which deals with recovery and reconstruction competency (Al Thobaity, 2016). Disaster nursing is therefore the systematic implementation of knowledge and skills towards solving or minimizing health hazards and life-threatening situation caused by disasters in collaboration with other fields of specialties. (Alfred et al., 2015).

Studies have shown that nurses' competencies have increased tremendously with the impact of simulation, it allows the acquisition of skills such as; clinical learning, clinical performance, confidence, critical thinking and self-efficacy through repeated practice and management of emergency situations without risk to clients or to the students and

health care personnel involved. However, nurses also need to adapt with difficult and dangerous situations or environments with limited amount resources and changing conditions, which might differ completely from their normal working environment. (Tzeng et al., 2016).

A study was carried out amongst 13 head nurses' general and specific self-efficacy, before and after an intervention consisting of three short computers based simulation exercises during an hour session. Management skills were assessed using a prototype training system called Dig-Emergo which is a computer simulation tool, the study indicates that short computer based simulation exercises provide opportunities for head nurses to improve management skills and increase their general self-efficacy. (Jonson et al., 2017).

It is of vital importance for nurses to possess effective communication skills to work effectively with other professional disciplines and officials involved in disaster situation and preparedness. In simulation exercise study carried out in (Gundrosen, Andenaes, Aadahl, & Thomassen, 2016), communication simulation training was carried out amongst experts in medical specialties in an emergency department at a university hospital in Norway and the outcome of the result shows how simulation training has helped in improving team communication which is an integral part in patient's safety mostly in emergency situations.

Another interesting simulation study was carried out to improve the confidence level of nursing students in responding to a mass casualty situation. This study gave an opportunity for nursing students to apply; communication, critical thinking and technical skills while practicing with emergency medical services, fire and police during a mass casualty situation. Students demonstrated rapid treatment protocols and clinical competency by performing simple triage, which also shows increased in confidence level on their nursing skills and in disaster response. (Strout, 2017).

According to Livingston et al. (2016) the importance of simulation in healthcare have grown exponentially over the past 8 years, a simulation event called disaster day began in the college of Nursing, this event has developed and expanded into a huge inter-

professional education activity and more importantly, it gives students in health care professions terrific opportunity to work in teams to provide care in a disaster setting. The outcome of the simulation event developed the students' knowledge of responsibilities & roles, similarly, it increased the collaborative efforts of nurses with other professional disciplines.

An interesting view from Li, Li, Yang & Xu (2016) studies found that, nurses are the largest and most important health care aid workers in a disaster relief team, their main goal is to assist the affected communities and individuals to attain the best possible health care. Without adequate knowledge and lack of competency in disasters response, the disaster situation might eventually get worse. Educating and training programs on disasters for nurses would help to improve nurses' competencies.

Nurses travel all over the globe to provide assistant and treatments in disasters or emergency situations, they could bring upon unique set of skills to manage the situations, skills such as; assessment, communication, recognition of priority and collaboration. Nurses' competencies in these skills allow them to make accurate, life-changing decisions in highly demanding and emergent circumstances. (Rafferty-Semon et al., 2017).

Similarly, nurses have also contributed immensely towards disaster mitigation for instance, in most countries prone to vector-borne disasters or rapidly spread contagious diseases, primary health nurses worked within the community to eliminate breeding places, by distributing mosquito nets, teaching oral rehydration techniques and implementing preventive measures to avoid disease outbreaks such as cholera. Nurses educate the community through direct contact, posters, media, and sometimes by teaching school pupils songs or verses about measures that can be done with little effort to make a difference. (Petrini, 2014).

Disaster epidemic and pandemic have resulted to a reasonable reduction in the world's population, close to 50% in Europe alone during the "Black plague" pandemic in 14th century. According to history, most of the great nations like; the old Egyptian empire, the Minoans, the Mayans and the Norse were immensely affected by earthquakes,

floods, famines, tsunamis etc. (Coppola, 2006). The table 1 below illustrates some of the most devastating disasters in the history of mankind.

Table 1: Selected notable disasters throughout history (Coppola, 2006)

Disaster	Year	Number killed
Mediterranean earthquake (Egypt and Syria)	1201	1,100,000
Shaanzi earthquake (China)	1556	830,000
Calcutta typhoon (India)	1737	300,000
Caribbean hurricane (Martinique, St. Eustatius, Barbados)	1780	22,000
Tamboro volcano (Indonesia)	1815	80,000
Influenza epidemic (world)	1917	20,000,000
Yangtze river flood (China)	1931	3,000,000
Famine (Russia)	1932	5,000,000
Bangladesh cyclone (Bangladesh)	1970	300,000
Tangshan earthquake (China)	1976	655,000

According to (Centre for Research on the Epidemiology of Disasters (CRED) (2015)) before any disaster can be documented into a database, at least one of the following should have happened: a report of 10 or more people been killed; 100 or more people reported affected; declaration of a state of emergency; call for international help. During the last 2 decades, the amount of disaster has immensely increased, about 2.6 billion people were affected by 85,000 natural disasters while Man-made /technological disasters have affected closed to 2 million people. (Alfred et al., 2015).

2.1 Types of disaster

Disaster can be broadly divided into 2; Natural disasters and Man-made/technological disasters. However, this research studies focused mainly on natural disasters, the reasons for this are; to have a more in-depth and specific research. According to (Sansnee, Marre, & Anthony 2014, p. 45) containing a research study allows it to become more precise and manageable, it allows other readers to determine whether the study has been rigorously considered by the researcher. In order words, this study would be quantified based on natural disasters only.

Similarly, for the fact that natural disasters have caused more harm globally and because natural disasters have been in existence since the beginning of time, it is a global issue irrespective of any country´s development or location, natural disasters occur everywhere. Kulig, Edge & Smolenski (2014) found out that, natural disasters have been increasing over the past 50 years and its negative impact on economic and health consequences are enormous. Assessing potential threats, implementing preventive measures and responding to these disasters are of paramount importance and requires the efforts and commitment of many professionals.

2.1.1 Natural disasters

Disasters that occur without the intervention of human or technology are classified as natural disasters. However, Smawfield & Brock (2013) states; according to United Nations International Strategy for Disaster Reduction (UNISDR), there is nothing like natural disaster, only natural hazards and these hazards can lead to disaster. Natural disasters can be divided into; Geophysical, Hydrological, Meteorological, Climatological and Biological disasters (Centre for Research on the Epidemiology of Disasters (CRED), 2013). The table 2 below illustrates the types of natural disaster subgroup, definition and classification.

Table 2 Natural disaster subgroup, definition and classification (CRED, 2013).

Disaster Subgroup	Definition	Disaster Main Types
Geophysical	Events originating from solid earth	Earthquake, Volcano, Mass Movement (dry)
Meteorological	Events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days)	Storm
Hydrological	Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up	Flood, Mass Movement (wet)
Climatological	Events caused by long-lived/meso to macro scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)	Extreme Temperature, Drought, Wildfire
Biological	Disaster caused by the exposure of living organisms to germs and toxic substances	Epidemic, Insect Infestation, Animal Stampede

Natural disasters have an enormous adverse effect on human societies all over the globe, climatic change is one of the main causes of natural disasters. As stated in Wang & Taylor (2016) according to United Nations International Strategy for Disaster Reduction(UNISDR), from the year 2000 to 2012, there had been 1.2 million deaths, 2.9 billion people affected and a total of 1.7 trillion dollars' economic loss globally due to natural disasters. The table 3 below shows the rate of death of top 10 countries affected by natural disaster in 2015.

Table 3: Top 10 natural disasters by number of death in 2015 (CRED, 2015).

EVENTS	COUNTRY	NO. OF DEATHS
Earthquake, April	Nepal	8,831
Heat wave, June	France	3,275
Heat wave, May	India	2,248
Heat wave, June	Pakistan	1,229
Heat wave, June	Belgium	410
Landslide, October	Guatemala	350
Flood, November	India	325
Riverine flood, July	India	293
Earthquake, October	Pakistan	280
Riverine flood, January	Malawi	278
	TOTAL	**17,519**

2.2 Disaster management

Disaster management is a team effort and requires professionals working together to achieve similar goals. Question why do some people, societies, countries bounce back and move forward after a disaster, and others continue to deteriorate? What makes the difference? How can individuals and communities increase their resilience, progress and improve their situation? Effective knowledge, skills are required to combat the myriad of disasters that confront mankind. (Petrini, 2014).

An interesting view from (Shaw and Neef, 2013, p.2) observed that, the most effective way to manage any disaster is to develop and implement an action plan, by working in conjunction with the locals to identify and analysis their vulnerabilities and capabilities. Often, local people are believed not to have the ability to copy with and recover from disaster situation.

In this modern day, managing disaster can be categorized into 4 segments; mitigation, preparedness, response and recovery. (Coppola, 2006). Mitigation and preparedness can be implemented before any disaster events, while response and recovery take place

after the events. However, (Powers and Daily, 2010) viewed managing disaster in 3 phases; preparedness, relief response and recovery.

2.2.1 Mitigation

This period is often called the preventive or risk reduction period, this is a very important stage in disaster management as it looks for how to stop or reduce the means or likelihood before the occurrence of any disaster. Although mitigation can be costly, time consuming and sometimes might not work according to plan because, some disasters are quite difficult to prevent or detect before it occurs, a good example is hurricane. But nevertheless, mitigation has been very significant and effective in disaster management. (Coppola, 2006, pp. 175-178).

2.2.2 Preparedness

To be well prepared for any situation, is half a victory and the time spent during disaster preparedness is time gain. Preparedness focused on long term goals, by ensuring continuous education, training, assessment and evaluation of activities that would be involved in disaster management. The actions taken in advance to ensure that there is adequate response, relief and recovery from the consequences of any disaster is called disaster preparedness. (Al Thobaity, 2016).

The primary goal of any disaster preparedness is to know what to do, how to do and to be well equipped with the right tools for any disaster situation. Hence, disaster preparedness tends to reduce the adverse effects of any disaster situation by ensuring an appropriate, timely and an effective organization, and the delivery of response and relief action. (Coppola, 2006, p. 209).

2.2.3 Response

Despite the preparedness or mitigation towards any disaster, disasters still occur irrespective of how well prepared a community or country could be. However, the affected community must respond fast and effectively towards any disaster that strikes. Response are those actions taken to limit loss of lives, injuries, damage of properties

and the environment that are taken before, during and immediately after disaster situation. This is the most complex stage in disaster management since it is conducted during a difficult and stressful situation. (Coppola, 2006, p. 251).

Response includes task such as; first aids treatments, searching and rescuing of those affected, provision of shelters, clean water, food, transportation, electricity and so on. Responders or aid workers should be well informed of the crises situation and well-coordinated during this process in order not to make the situation more disastrous. Education, training and exercises would go a long way to help develop the skills required of aid workers. (Coppola, 2006, p. 252).

2.2.4 Recovery

Disaster of any kind always has its adverse effect on a country or community affected irrespective of how well mitigation, preparedness and the respond of the community towards the disaster. Disaster leads to loss of properties, infrastructures, physical and psychological damage, disruption of social, economic activities and could even lead to loss of lives. The process in which these damages are reconstructed or return to a functioning condition is known as recovery. (Coppola, 2006, p. 299).

"Disaster recovery is the emergency management function by which countries, communities, families and individuals repair, reconstruct or regain what has been lost as result of a disaster and, ideally reduce the risk of similar catastrophe in the future.", Recovery planning can even begin before a future disaster occur, this helps to save time as recovery during disaster is the most costly and diverse amongst disaster management, unfortunately, it is the least organized and least studied in managing disaster. (Coppola, 2006, p. 299).

3 PURPOSE & AIM OF THE STUDY AND RESEARCH QUESTION

The purpose of this research study is to have an in-depth knowledge on how simulation studies are being applied in natural disaster situations. While this study aims to seek how useful simulation studies are in enhancing nurses' knowledge and their competencies in disaster situations.

Research question:

- Can simulation improve nurses' competencies in natural disaster situations?

4 RESEARCH METHODOLOGY

4.1 literature review

Literature review is a means of seeking an in-depth study and interpreting of literature that relates to a specific topic. In this kind of methodology, a research question is identified and the answer to the question is sought by searching, identifying and analysing suitable literature in a systematic manner. (Aveyard, 2010).

In rehabilitation professions and allied health, there are three most common approaches to synthesize and interpret existing literature; narrative literature reviews, empirical literature reviews, and meta-analyses. Of recent, the emergence of scoping literature reviews as an alternative to these methods has been witnessed by many medical and social science fields. (Rumrill, Fitzgerald & Merchant, 2010). For this research study, a scoping literature review method will be used.

4.1.1. Scoping literature review

The literature review that tends to identify the quality and quantity of research on a particular topic is a scoping review. (Al Thobaity, 2016). However, Arksey & O'malley, (2005) defines a scoping study as a kind of literature review method that aim at mapping out the key concepts in a research area, the main sources and types of evidence available for the research in question.

There are four main reasons why scoping study is usually undertaken;

- It can be used to access the extent and nature of research activity.
- It is a useful means of mapping fields of study where it is hard to access the extent of availability of materials.
- It could be used as a step towards taking a full systematic review.
- It can also be used to summarise research findings. Similarly, it can be used to identify research gaps in the existing literature. (Arksey & O'malley, 2005).

The process of conducting a scoping study can be categorized into 5 stages; Research question identification, identification of relevant studies, study selection, compiling the data, collating, summarizing and results reporting. In addition to the 5 stages, there is an optional stage 6 consultation stage. (Arksey & O'malley, 2005; Rumrill et al., 2010).

Scoping literature review is advantageous because, it exposes a researcher to numerous amount of published literature in an efficient and cost-effective way. It also provides good foundations for future study by mapping out research questions, identifying gaps in the knowledge base and revealing the most common means that researchers use with a given content domain. (Rumrill et al., 2010). However, as other research methodologies face challenges so are literature review methods. Some of the difficulties are; the dependent of the reviewer's abilities to locate articles, numbers of relevant articles on the research topic etc. (Moule & Goodman 2014, pp. 276-277).

4.1.1.2. categories of scoping review

Scoping review can be categorized into; conceptual mapping, policy mapping reviews and literature mapping which is the most common amongst them. Literature mapping has two main goals; identifying the location of the literature on a topic and determining the magnitude of the research on a topic. With literature mapping, a researcher could consider a specific timeframe for the literature to be mapped, where the researches are being conducted, what kind of practitioner or researcher that conducted the research, publishing source etc. (Rumrill et al., 2010).

For this research, the focus is to find out how much relevant researches have been carried out on simulation studies and its impact on nurses' competences.

5 RESEARCH PROCESS

The process of this scoping review includes the following: identifying research question and objectives; indicating the inclusion and exclusion criteria; identifying search strategies, results extractions and collations; results discussions and conclusions.

5.1 Identifying research question and objective

Research question is; can simulation improve nurses' competencies in natural disaster situations? And the objectives of this research are; how useful simulation studies are in enhancing nurses' knowledge and their competences in disaster situations.

5.2 Inclusion and exclusion criteria

The inclusion and exclusion criteria for this study were; the year of publication of articles which ranges from the year (2012-2017), the disasters considered were just natural disasters, articles were all in English language, peer reviewed, full text and concentrated mainly on nursing training. This study considered articles on simulation training in natural disasters and all phases of natural disasters.

However, this scoping review includes all types of studies; qualitative, quantitative and mixed methods, it examined simulation studies in all fields like hospital settings, disaster situations etc. The table 4 below summarizes all the inclusion and exclusion criteria.

Table 4: Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Length of article	Full	Abstracts
Year of publication	≥ 2012-2017	< 2012
Study focus and focus of study	Natural disasters and healthcare profession	Man-made disasters & other profession
Study place	Globally	Nil

5.3 Search strategies

Relevant studies on the integration of simulation in development of Nurses competencies in Natural Disaster situation were identified via various databases; ProQuest, CINAHL, EBSCO Academic Search Premier, PubMed, ScienceDirect. However, further studies search was carried out via Google Scholar.

All articles were filtered in (English and the year between 2012-2017), this was followed by analyzing the words contained in the title, the abstract and the index terms used for the article description. The keywords used for the search were; Natural disasters, Nursing, Simulation training, Competencies, Disaster nursing. Searches were conducted electronically, and all relevant studies were imported into "Refworks" and an external hard drive for safety and future purposes.

5.4 Study selection

The electronic databases produced a total relevant search of 297 articles (ProQuest, n=37, CINAHL, n=34, EBSCO Academic Search Premier, n=21, PubMed, n=84, ScienceDirect, n=121). The number of articles were reduced to 119 because of the following criteria; some articles were duplicates; the full version of some articles was not accessible, some articles focused mainly on man-made disasters. The 119

articles were fully read and reread closely and a total of 13 articles were used for final review of the scoping method. The search strategy is illustrated in figure 1 below;

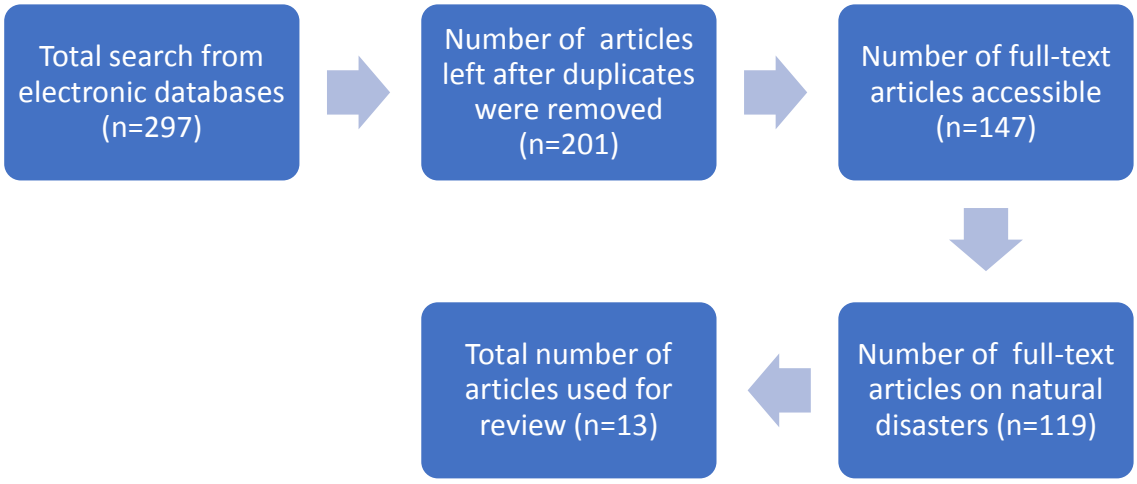

Figure 1: The search strategy for the scoping review method

5.5 Compiling the data

Data extracted from the 13 final studies were compiled based on their author(s), years of publications, area of focus, and collating, summarizing and result reporting. The table 5 in the appendix demonstrates the data relevant to the objectives of this study, the table is made up of 17 pages in total.

5.6 Data analysis

One of the most widely used relevant method in health care research is content analysis. It gives empiric analysis from literatures by narrating, organizing and quantifying the facts (Elo & Kyngäs, 2008). This research study aims to seek how useful simulation studies are in enhancing nurses' knowledge and their competencies in disaster situations, and to have an in-depth knowledge on how simulation studies are being applied in natural disaster situations.

In addition to the above view, the literatures need to be; comprehended, summarized and synthesized in a systematic way. Reading from authors with similar viewpoints or similar methods can be placed together in a logical order once the scope of the literature to be discussed is identified. (Sansnee et al., 2014, pp. 38-39).

The findings of this research study were presented in a tabular form (see the table 5 in appendix). However, the discussion of the results would be presented in a way where similar findings will be placed in the same categories. The findings would be broken down into manageable categories like; phrases, clauses, sentences and theme.

6 RESULTS

The final 13 results from the studies from 2012-2017 would be categorised into sub-groups based on their similarities. Below are the sub-categorises of the findings:

6.1 General outcome

Simulation can be cost effective approach as well as means of improving nurses' competencies in disaster situations. The data compiled from Dubovsky et al. (2017) highlighted how computerized stimulation patient exercise study has improved the participants self confidence in emergency department. The nurses' ability to prioritize triage patients according to standard principles and procedures were practicalized, thus, simulation can improve nurses' competencies in natural disaster situations as 80% of the participants when asked if the simulation exercise reflects the real-life experience replied in the affirmative but only pointed out that there would be more physical demands in real life situations as against the computer based simulation exercise.

"The computer based simulation exercise reflects real-life situation…there would be more physical demand in a real-life situation".

Chen et al. (2015) study looks at the competency of nurses during natural disaster from a perspective of hospital evacuation and it procured recommendations to reduce the evacuation process to a minimal time.

"Minimizing evacuation time would go a long way in saving or reducing the risk of losing victims in disaster situation".

Study focused on simulation, hospital evacuation plan amongst others using the 2k factorial experiment method; analysing the interactions between number of nurses (n), ambulance (a), stretchers (s) and coordinators during a hospital evacuation. The interaction results suggested that the best outcome would occur when (S & A both take the same level, N & S take the same level, and N & A take the same level). It was also highlighted in the study that, simulation practices have provided relevant tool for

manager to explore on different alternatives and strategies to face evacuation situations, experiments on simulation have proven and quantified to the contribution of evacuation time reduction. (Chen et al., 2015).

Considering how simulation studies are being applied in natural disaster situations, (Monod et al., 2014) study accessed simulation training using four skills; handling of emergency situations, self-confidence, algorithm knowledge and team communication. The study showed that professional competency would improve with the implementation of simulation training where higher self-confidence would result in better handling of emergency situations, patient safety improvement and the participants when asked if they would have rather trained alone disagreed, thereby indicating positive impact of efficient communication skills, working in a group as multi professionals. The study showed that with simulation training all the four skills could be improved.

The same conclusion can be drawn from the (Zapko et al., 2015) simulation study based on variety of medical specialization and care, participant's confidence in being able to care for their patients during a disaster was found to have increased, they admitted to the simulation exercise being a valuable learning experience. Participants were said to have exhibited critical thinking skills, prioritization of care and clinical decision making, all these can be said to amount to competency as well as expectant application of the simulation studies in actual natural disaster situations.

"Simulation exercise is a valuable learning experience to us…we learn by observing others"

6.2 Insufficient and lack of simulation studies

Nilsson et al. (2016) emphasized the importance of knowledge, skills and experiences in disaster situation, however, the research also stressed how lack of simulation studies had degraded nurses' competencies in disaster situation. Thus, simulation studies are imperative for the development of nurses' competencies in disaster situation.

"Disaster exercises based on realistic threats are one way of establishing and upholding nurses' competencies in disaster nursing. With today's technology, the opportunity for simulation should be an excellent alternative to real disaster exercises".

Xu & Zeng (2016) study proposed that, the current situation of disaster responses of emergency department nurses in China is alarming. It highlighted factors such as; lack of knowledge on disaster nursing; no comprehensive, standardized & systematic disaster nursing education; nurses little training in the emergency department triage; insufficient disaster nursing continuing education & training efforts; and few research on disaster nursing in China. Study strongly recommends: Strengthening scientific research on disaster nursing; taking advantage of male nurses; and variety of training methods such as: simulation exercises, role play, movie watching, case discussions & practice skills.

"There is little training and nursing education related to disaster…disaster nursing started very late in china". "…male nurses are more resilience compared to female nurses".

However, the study further made it known that male nurses seem to be more competent due to the physiological and physical differences between the female and male gender. (Xu & Zeng, 2016).

6.3 Comparative studies

Being knowledgeable and having training in simulation exercise contributes immensely in improving competencies. A comparison study between diploma nursing students and nursing students was conducted in the (Alim et al., 2015) study, which accessed how effective training is for preparedness using pre-and post-training evaluation method. The study depicted that the mean score was lower for diploma students than undergraduate students. Generally, the extent of preparedness in both students were achieved though relative to whatever previous experience or training they had, study proved that disaster preparedness can be improved with training exercise.

"…simulation training allows students experience what might be difficult to replicate… a clinical setting".

"Simulation exercises have increased our self-confidence…"

However, other studies also stressed the importance of integrating disaster simulation studies and training in the curriculum of nursing students for them to have an in-depth knowledge and preparedness for disaster before becoming a professional. Training and practices improved the knowledge and ability of disaster preparedness. (Alfred et al., 2015; Distelhorst & Wyss, 2013; Kaplan et al., 2012; Nilsson et al., 2016; ÖztekİN et al., 2014).

It is imperative to include simulation training to develop the competencies level of nursing students, the outcome of all these studies show an improvement in the competencies level of the students, most students stressed the impact of these training and hope for more training in the nearest future. Similarly, studies compared nursing students to registered nurses and it was found out that the competency level of qualified nurses mostly those with some experiences in disaster or emergency are higher compared to newly qualified nurses and those who lack experience in emergency or disaster situation. (Monod et al., 2014; ÖztekİN et al., 2014).

"Professional competency is strengthened by simulation training…"

In another study where two groups of students; one group participated in simulation and lab before their first clinical experience and the other group participated in lab only, the group that underwent both simulation and lab exhibited statistically significant reduced stress levels on their first clinical experience practice unlike the second group who partook only in lab. A survey was carried out after the simulation exercise and it was observed that the simulation exercise served as a means of exposure and preparedness for participants to implement techniques used in disaster response and management. (Kaplan et al., 2012).

"Simulation exercise changed our perspective of respiratory disease transmission…we would change our selection of respiratory protection when challenged with these signs and symptoms in the future".

The study from (Öztekin et al., 2014) examined nursing student's educational needs concerning disaster preparedness and response in universities in Istanbul and Miyazaki, it was discovered that most students in Istanbul had more knowledge of disaster preparedness and response from their course compared to students in Miyazaki who had less knowledge of them. The study emphasized the importance of mass casualty care and disaster management skills being a part of undergraduate studies in both cities.

Alfred et al. (2015) studied simulation disaster nursing competency, emergency preparedness and nursing education. The study first brought to light the educational needs for emergency preparedness and disaster nurses' competency, after which it went further to show the need for simulation, majorly collective simulation by communities as clinical experience for nurses. It emphasised the effect and importance of developing a collaborative disaster simulation, collaboration between universities and collaboration with community agencies. Thus, partnering with others would make better clinical experiences for nursing students and nurse educators.

"Simulation techniques allow students experience what might seem difficult to replicate in the classroom or in a clinical setting".

This study answers the research objective and suggests that simulation improves nurses' competencies in natural disaster situations.

6.4 Team work

The impact of efficient communication skills, triage and working effectively in group as multi-professional is of vital importance in disaster situations. As indicated in (Monod et al., 2014; West et al., 2015; Zapko et al., 2015) studies, professional competency can be strengthened in simulation training with effective communication skills and working effectively as a group of professionals. It is essential to have good inter-professional

relationship and effective communication skills in disaster situations, these help in improving health care provider clinical experiences.

"...we learn by observing other…we have better empathy for patients".

According to (West et al., 2015) studies, disaster rescue teams always comprises of team of professional. Working effectively with other disciplines is an essential skill for healthcare professionals and will have a positive impact in disaster situations. Although, it might seem difficult to coordinate stimulation training sessions that would be of interest to all member in multi-professional group, but the main objective of simulation-based courses should be based on having an effective practice with issues such as; task distribution, sharing of patient monitoring and management decisions, effective communication between team members and shared communication with patients and families etc.

"…working effectively with other professionals is an integral skill for all healthcare personnel …"

6.5 Effectiveness in simulation

Another alarming situation in disaster preparedness is on rural nursing and rural communities. Kulig et al. (2014) states that; there should be more disaster training and education in rural hospitals and rural nursing. By enhancing & building resilience in communities, rural nurses can contribute immensely to reducing disaster risk, the study similarly stressed the impact of effective communication and information. Nursing competencies in rural hospital, disaster preparedness educational needs and rural nurses were examined in relation to care of vulnerable population domain, where it was ascertained that, special evacuation needs to enhance disaster preparedness should be in existence as rural hospitals lacked readily available personnel and certain facilities which were available to urban areas.

"There are very little disaster training and education in rural hospitals and rural nursing".

Under the communication and information sharing domain in other to avoid repeating failings such as incorrect report by the media, inability to update the public of the disaster situation, for rural areas disaster preparedness to improve there ought to exist an effective communication before, during and after the disaster.

"The communication and information to the public during disaster situations are ineffective…disasters can be effectively reduced if people are well informed and motivated towards disaster prevention and resilience".

External support requirements need to be put in place as trust is a necessity in accepting help from external sources mostly during a vulnerable period, this was under the policy development and planning domain. The long-term individual, family and community recovery domain states that there should be a sustained support for individuals and families. (Kulig et al., 2014).

However, in a study based on community nursing simulation using themes such as; care of individuals in the community, health of communities, care of aggregates in the community and care of vulnerable populations in the community. Students reported increased self-confidence when approaching independent work in their actual clinical experience due to the simulation exercises. (Distelhorst & Wyss, 2013).

"…there should be more research on community-based simulation activities…our self-confidence increases with simulation exercises…"

6.6 Research assessment and Ethical issues

Assessing literature is the degree of steps taken in the research study to minimize bias and error in its design, conduct and analysis. It is imperative to determine whether there is a quality threshold that defines the weakest included study that is acceptable. However, having suitable checklists for each study that meets the criteria included is of vital importance. If inclusion criteria do not exist, then the validity, reliability and applicability of the study might be compromised. (Gerrish & Lathlean, 2015, pp. 344-347).

The process of this scoping review includes; identifying research question and objectives; indicating the inclusion and exclusion criteria; identifying search strategies, results extractions and collations; results discussions and conclusions. The inclusion and exclusion criteria were described in table 4 above.

Research ethics is making sure that a research is conducted in a proper and honest way. It is highly important for a researcher to have a broad knowledge of research ethics before embarking on a research process. A researcher must adhere to the rules of a research process, the moral principles that guides a researcher throughout the completion of a research process is known as research ethics (Siu & Comerasamy, 2013, pp. 88-89).

However, a researcher must faithfully managed data collection throughout the research study and beyond, credits need to be given to the participant or the original researcher. Similarly, the methodology used for research process must have clear steps showing how data would be analyzed and interpreted (Sansnee et al., 2014, p. 72).

Giving credits to the actual paper or researcher is called referencing. Referencing illustrates and ascribes the sources of the information used, grant authority to the attest made and gives room for readers to refer to full copies of articles they are interested in without be penalised for plagiarism or copyright. In order words, good referencing support and justify the researcher's arguments; allows comparisons with other research; illustrates researcher's familiarity with the field of research. (Moule & Goodman, 2014, p. 153).

This scoping review study basically accessed studies from within the year 2012-2017 from electronic data base, which produced a total number of 279 relevant articles from the initial search (ProQuest, n=37, CINAHL, n=34, EBSCO Academic Search Premier, n=21, PubMed, n=84, ScienceDirect, n=121). All the final 13 articles used for this study were scientific and peer reviewed, the information obtained from the final articles were documented in a tabular format. Credits were given to each of the original researcher by documenting the original researcher's name and the year of studies along with the

information obtained from each of the articles. The Table 5 in appendix elaborates in detail how the information extracted were presented.

7 DISCUSSION AND CONCLUSIONS

The impact of simulation in healthcare and in disaster situation can only be achieved if the relevant applications are fully integrated into the routine of healthcare delivery. Simulation is however more complex in health and difficult as opposed to other area, Patient care is naturally more complex, and requires more human empathy and connection. Probably, simulation might never replace the preference for training of the apprenticeship system of supervised work on real patients. Unlike airplanes or nuclear power plants, there is no possibility to design and build human beings. (Gaba, 2007).

Another challenge faced by simulation training is that, it is subjective to the nature of the disaster. Establishing these competency criteria across all aspects of disasters and healthcare will be a huge challenge. To achieve a promising future of simulation in disaster depends on the commitment and ingenuity of the healthcare personal to see that improved patient safety using this tool becomes a reality. (Gaba, 2007).

However, Nurses' competencies in disaster situation can be improved with constant and relevant knowledge, skills and training relating to disasters. Their critical thinking skills, evidence based practices are of paramount importance in preventing or reducing the myriad of disasters. Disaster either natural or manmade are often chaotic situations which cannot be totally eradicated nor avoided especially natural disasters such as earthquakes, floods, hurricanes and much more, hence the need for their preparedness when they occur. (Distelhorst & Wyss, 2013).

Usually every capable person who may or may not be directly affected by disaster would assist in the rectification of the situation, majorly those in the medical field (nurses, doctors and other health care personnel) are extremely important for relief as the occurrence of disasters brings about physical injuries, death and several other harms. This study focuses on analysing the need for preparedness of nurses with the use of simulation to boost their competencies to better handle the occurrence of disasters. Simulation training have proven to be a resourceful means for nurses, nursing students and other health care personnel, providing them with the opportunity to practice physical assessment and technical skills. (Distelhorst & Wyss, 2013).

The interesting aspect of disaster nursing is that, it focuses more on the affected population rather than individual care. Simulation is one of the most effective methods for disaster preparedness, as it enables the transfer of disaster situations from hypothetical to practical without any risk to students, nurses or any personnel involved. Simulation instils several skills such as critical thinking, experience, recognition of priority, collaboration and communication with other professionals, confidence and many more which increases the effective response and competency of nurses in natural disasters.

However, simulation training and exercises should be viewed holistically, there should not be any preference over an urban area to a rural area, or one sex having preference to another. Similarly, effective communication and information could go a long way towards solving problems, people are being misinformed mostly in disaster situations. (Kulig et al., 2014).

This research made use of the scoping literature review methodology using a total number of thirteen articles from the results review. Analysing and drawing suggestions, indications and conclusions from these articles which were directly or indirectly focused on disaster preparedness and response, need for simulation studies and nurses' competencies from similar angles and comparisons within their various individual studies.

The research question can simulation improve nurses' competencies in natural disaster situations has been answered in the affirmative, as the knowledge and skills gained from simulation studies proved to be an improvement in the competency of participants in simulation studies. This has been proven from the reviewed articles which conducted comparison between nurses or nursing students who had undergone simulation and those who had not, this also satisfies the research objective of how useful simulation studies are to enhance nurses' knowledge and their competencies in disaster situation. The reviewed studies also pointed out how simulation studies are being applied in natural disaster situations.

8 RECOMMENDATIONS

- Simulation studies and disaster nursing should be included in the curriculum of nursing students. However, qualified nurses should be encouraged and be given the opportunities to undergo simulation training.
- Material resources and man power should always be prepared beforehand should in case the occurrence of a disaster.
- Variety of methods such as case discussions, movie watching, and role playing, and practice skills should be used in disaster preparedness alongside simulation.
- Scoping literature review as a methodology is very resourceful and there should be more of these studies in the nearest future.
- Simulation can help nurse acquire and develop knowledge which directly or indirectly contributes to improve patient safety.

LIST OF REFERENCES

Alfred, D., Chilton, J., Connor, D., Deal, B., Fountain, R., Hensarling, J., & Klotz, L. (2015). Preparing for disasters: education and management strategies explored. *Nurse education in practice,* 15(1), 82-89. http://dx.doi.org/10.1016/j.nepr.2014.08.001

Alim, S., Kawabata, M., & Nakazawa, M. (2015). Evaluation of disaster preparedness training and disaster drill for nursing students. *Nurse education today*, 35(1), 25-31. http://dx.doi.org/10.1016/j.nedt.2014.04.016

Al Thobaity, A. (2016). What are the most common domains of the core competencies of disaster nursing? A scoping review. International Emergency Nursing. DOI: http://dx.doi.org/10.1016/j.ienj.2016.10.003

Arksey, H., & O'malley, L. (2005). Scoping Studies: Towards a Methodological Framework. *International Journal of Social Research Methodology*, 8(1), 19-32. doi:10.1080/1364557032000119616

Aveyard, H. (2010). *Doing a Literature Review In Health And Social Care:* A Practical Guide (2). Berkshire, GB: Open University Press. Available from: http://ebookcentral.proquest.com.anna.diak.fi:2048/lib/diak/reader.action?docID=771406. Accessed 09.12.2016

Chen, W., Guinet, A., & Ruiz, A. (2015). Modeling and simulation of a hospital evacuation before a forecasted flood. *Operations Research for Health Care,* 4, 36-43. http://dx.doi.org/10.1016/j.orhc.2015.02.001

Coppola, D. P. (2006). *Introduction to International Disaster Management*. Burlington, US: Butterworth-Heinemann. Available from: http://ebookcentral.proquest.com/lib/diak/reader.action?docID=1929997. Accessed 11.12.2016.

CRED-Centre for Research on the Epidemiology of Disasters (2013). *Annual disaster statistical review: the numbers and trends*. Edited by Guha-Sapir, D., Hoyois, P. H., & Below, R. Institute of Health and Society (IRSS) Brussels. Available from: http://www.cred.be/sites/default/files/ADSR_2013.pdf. Accessed on 02.02.2017.

CRED-Centre for Research on the Epidemiology of Disasters (2015). *Annual disaster statistical review: the numbers and trends.* Edited by Guha-Sapir, D., Hoyois, P. H., & Below, R. Institute of Health and Society (IRSS) Brussels. Available from: http://www.cred.be/sites/default/files/ADSR_2015.pdf. Accessed 06.02.2017.

Distelhorst, K. S., & Wyss, L. L. (2013). Simulation in community health nursing: A conceptual approach. *Clinical Simulation in Nursing*, 9(10), e445-e451. http://dx.doi.org/10.1016/j.ecns.2012.07.208

Dubovsky, S. L., Antonius, D., Ellis, D. G., Ceusters, W., Sugarman, R. C., Roberts, R., … Richard Braen, G. (2017). A preliminary study of a novel emergency department nursing triage simulation for research applications. *BMC Research Notes*, 10, 15. http://doi.org/10.1186/s13104-016-2337-3

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing* 62(1), 107-115.

Gaba, D. M. (2007). The future vision of simulation in healthcare. *Simulation in Healthcare*, 2(2), 126-135. Available from: https://pdfs.semanticscholar.org/84ad/f54984dd0c2e6273036bb36aa6433f898ea1.pdf. Accessed 05.12.2016.

Gerrish, K., & Lathlean, J. (2015). *The research process in nursing*. West Sussex, UK: Wiley & sons.

Gundrosen, S., Andenæs, E., Aadahl, P., & Thomassen, G. (2016). Team talk and team activity in simulated medical emergencies: a discourse analytical approach. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 24(1), 135. DOI: 10.1186/s13049-016-0325-1.

Jonson, C. O., Pettersson, J., Rybing, J., Nilsson, H., & Prytz, E. (2017). Short simulation exercises to improve emergency department nurses' self-efficacy for initial disaster management: Controlled before and after study. *Nurse education today*, 55, 20-25. DOI: http://dx.doi.org/10.1016/j.nedt.2017.04.020

Kaplan, B. G., Connor, A., Ferranti, E. P., Holmes, L., & Spencer, L. (2012). Use of an Emergency Preparedness Disaster Simulation With Undergraduate Nursing Students. *Public Health Nursing*, 29(1), 44-51. doi:10.1111/j.1525-1446.2011.00960.x

Kulig, J. C., Edge, D., & Smolenski, S. (2014). Wildfire disasters: Implications for rural nurses. *Australasian emergency nursing journal*, 17(3), 126-134. http://dx.doi.org/10.1016/j.aenj.2014.04.003

Li, S. M., Li, X. R., Yang, D., & Xu, N. W. (2016). Research progress in disaster nursing competency framework of nurses in China. *Chinese Nursing Research*. Available from: http://ac.els-cdn.com/S2095771816300913/1-s2.0-S2095771816300913-main.pdf?_tid=6133e1c4-bbf8-11e6-bc35-00000aacb35d&acdnat=1481058793_81b5f141b67676411bce3afeeb4bd24d. Accessed 12.12.2016.

Livingston, L. L., West, C. A., Livingston, J. L., Landry, K. A., Watzak, B. C., & Graham, L. L. (2016). Simulated Disaster Day: Benefit from lessons learned through years of transformation from silos to interprofessional education. *Simulation in Healthcare*, 11(4), 293-298. DOI:10.1097/SIH.0000000000000173.

Monod, C., Voekt, C. A., Gisin, M., Gisin, S., & Hoesli, I. M. (2014). Optimization of competency in obstetrical emergencies: a role for simulation training. *Archives of Gynaecology and Obstetrics,* 289(4), 733–738. http://doi.org/10.1007/s00404-013-3111-6

Moule, P., & Goodman, M. (2014). *Nursing research. An introduction*. City road, London: Sage.

Nilsson, J., Johansson, E., Carlsson, M., Florin, J., Leksell, J., Lepp, M.,.. & Gardulf, A. (2016). Disaster nursing: Self-reported competence of nursing students and registered nurses, with focus on their readiness to manage violence, serious events and disasters. *Nurse education in practice,* 17, 102-108. http://dx.doi.org/10.1016/j.nepr.2015.09.012

ÖztekİN, S. D., Larson, E. E., Altun Uğraş, G., & Yüksel, S. (2014). Educational needs concerning disaster preparedness and response: A comparison of undergraduate nursing students from Istanbul, Turkey, and Miyazaki, Japan. *Japan Journal of Nursing Science*, 11(2), 94-101. doi:10.1111/jjns.12008

Petrini, M. A. (2014, March). *Mitigation, resilience, and nursing.* Nursing & Health Sciences. pp. 1-2. doi:10.1111/nhs.12132.

Powers, R., & Daily, E. (Eds.). (2010). *International Disaster Nursing*. Melbourne, AU: Cambridge University Press. Available from: http://site.ebrary.com.anna.diak.fi:2048/lib/diak/reader.action?docID=10520656. Accessed 10.12.2016.

Rafferty-Semon, P., Jarzembak, J., & Shanholtzer, J. (2017). Simulation Complex Community Disaster Preparedness: Collaboration for Point of Distribution. *Online Journal of Issues in Nursing,* 22(1), 1. doi:10.3912/OJIN.Vol22No01Man03

Rumrill, P., Fitzgerald, S., & Merchant, W. (2010). Using scoping literature reviews as a means of understanding and interpreting existing literature. *Work,* 35(3), 399-404. doi:10.3233/WOR-2010-0998

Sansnee, J., Maree, J., Anthony, W. (2014). *Research Methods in Nursing and Midwifery. Pathways to Evidence-based Practice*. Oxford university press.

Shaw, R., & Neef, A. (2013). *Risks and Conflicts: Local Responses to Natural Disasters.* Emerald Insight. Available from: http://site.ebrary.com.anna.diak.fi:2048/lib/diak/reader.action?docID=10825577&ppg=22. Accessed 05.02.2017.

Siu, C., & Comerasamy, H. (2013). *Doing a research project in nursing & midwifery: A basic guide to using the research literature review methodology*. London: Sage.

Smawfield, D., & Brock, C. (Eds.). (2013*). Education as a Humanitarian Response: Education and Natural Disasters (1).* London, GB: Bloomsbury Academic. Available from: http://site.ebrary.com.anna.diak.fi:2048/lib/diak/reader.action?docID=10638837. Accessed 12.01.2017.

Stanely, S., & Bennecoff, W. T. A. (2015). *Designing and integrating a disaster preparedness curriculum.* Available from: http://ebookcentral.proquest.com.anna.diak.fi:2048/lib/diak/reader.action?docID=3440209. Accessed 13.07.2017.

Strout, A. (2017). *Interprofessional Mass Casualty Incident Simulation Design Protocol to Prepare Prelicensure Nursing Students to Respond to a Disaster*. Nurse Educator. DOI: 10.1097/NNE.0000000000000365

Tzeng, W. C., Feng, H. P., Cheng, W. T., Lin, C. H., Chiang, L. C., Pai, L., & Lee, C. L. (2016). Readiness of hospital nurses for disaster responses in Taiwan: A cross-sectional study. *Nurse education today*, 47, 37-42. http://dx.doi.org/10.1016/j.nedt.2016.02.025.Accessed 07.07.2017.

Wang, Q., & Taylor, J. E. (2016). Patterns and Limitations of Urban Human Mobility Resilience under the Influence of Multiple Types of Natural Disaster. *Plos ONE*, 11(1), 1-14. doi:10.1371/journal.pone.0147299

West, C., Veronin, M., Landry, K., Kurz, T., Watzak, B., Quiram, B., & Graham, L. (2015). Tools to investigate how interprofessional education activities link to competencies. *Medical Education Online*, 20, 10.3402/meo.v20.28627. http://doi.org/10.3402/meo.v20.28627

Xu, Y., & Zeng, X. (2016). Necessity for disaster-related nursing competency training of emergency nurses in China. *International Journal of Nursing Sciences*, 3(2), 198-201. http://dx.doi.org/10.1016/j.ijnss.2016.04.009

Zapko, K. A., Ferranto, M. L., Brady, C., Corbisello, A., Hill, D., Mullen, R., & ... Martin, L. (2015). Interdisciplinary Disaster Drill Simulation: Laying the Groundwork for Further Research. *Nursing Education Perspectives* (National League for Nursing), 36(6), 379-382. doi:10.5480/14-15

APPENDICES

Appendix 1(17)

Table 5: Data compilation from the final studies

AUTHORS	YEARS	AREA OFFOCUS	COLLATING, SUMMARIZING AND RESULTS REPORTING
Dubovsky et al.	2017	• Emergency department of dis-asters, • Simulated patient exercise, • Computer simulation, • Female Nurses, • Triage.	This study addresses the validity & feasibility of a newer multi-user virtual reality platform as a representative for staff behaviour in the Emergence Department(ED). Similarly, the process of triage was measured, the order in which patients were called & the time spent with each patient were assessed. However, in this research, participants' ability to prioritize triage patients according to standard principles and procedures were evaluated; simulation task was equivalent to their subjective workload during a regular work day based on the standard principles. Study suggests that virtual reality triage can serve as a valid model of actual ED triage that could enhance the study of the impact of stresses such as disasters on staff functioning before the occurrence of these events. There were positive attitudes from those who participated in the simulation training. When asked if simulation exercise reflects to their real-life experience,

			80% of the participants answered in affirmative. For the fact that its computer based exercise, participants realise there would be more physical demands in real-life situation as compared to the simulation exercise. Also, for the fact that there were an increasing number of disasters that stress the ED, & more importantly it's staff, makes it imperative to develop protocols that will enhance safe & efficient situation in events that have not been encountered by many institutions. it was seen in the study that computerized simulations can be cost-effective approaches towards testing new methods of addressing mass events such as epidemics.
Nilsson et al	2016	• Nursing student & registered nurses, • Hospital settings (emergency care & non-emergency units), • Comparative studies.	Comparative studies on disaster nursing competence was carried out between student nurses (SNs) and registered nurses (RNs), RNs show significantly higher competence than SNs. Similarly, RNs with experience in emergency care show highly competence than those without previous experience in emergency care. Thus, the longer their experience in emergency care, the higher their competences. Study also shows that RNs competence in complying with safety regulations and applying principles of disaster medicine during serious events, both within and outside healthcare facilities are less commonly used to competence in dealing with harm or violence. Reasons for this might be that, RNs are not often

			exposed to real disaster events, also, nurses' competences are not maximised because they are considered less valuable resource in disaster work. Emphases on encouraging more disaster nursing in curriculum was raised; the Higher educational institution where student nurse scored highest on disaster nursing competence (DNC) has included in their curriculum, a considerable amount of disaster nursing. Finally, this research stressed the importance of including stimulation studies for nurses' preparedness; "*Disaster exercises based on realistic threats are one way of establishing and upholding disaster nursing competence in nurses. With today's technology, the opportunity for simulation should be an excellent alternative to real disaster exercises*". Thus, simulation studies are imperative for the development of nurses' competence in disaster situation.
Xu & Zeng	2016	• Emergency nurse • Influencing factors for disaster nursing • Holistic care in disaster situation • China	The authors highlighted; Status & role of emergency nurses in disasters: nurses are integral part of disaster relief operations. They are involved in disaster site rescue, triage, transportation, psychological nursing, safety nursing & health education, they are also involved in health & quarantine in natural & man-made disasters and public health emergency rescues both locally and internationally.

			Similarly, the current situation of disaster responses of emergency department nurses was discussed. There was little participation of disaster rescue nursing personnel; lack of knowledge on disaster nursing; no comprehensive, standardized & systematic disaster nursing education; nurses little training in the emergency department triage; insufficient disaster nursing continuing education & training efforts; and few research on disaster nursing in China. Study shows factors influencing the nurses' ability of disaster nursing in emergency department; • Gender, male nurses are more resilience compared to their female counterparts' due to physical fitness, endurance, and other physiological advantages, mostly during physical work like when lifting, moving & transporting. • Educational degree, there is relatively low educational degree of nursing staff. According to the data in 2013 yearbook "Chinese health statistics", the % of Chinese nurses with college degrees was 56% and those with undergraduate and higher education was only 10.6% in 2012. • Training & experience; there is little training and nursing education related to disaster. However, nurses with experience in disaster can view the shortage of disaster trained nurses & understood the important of rescue work. • Other contributing factor was that, disaster nursing started quite late in China.

			However, strong recommendations were discussed on improving the disaster nursing ability of emergency department nurses, amongst of the recommendations were: Disaster nursing theory training; Disaster nursing skills training; Disaster rescue plan and rehearsal; Preparation of manpower and material resources. To conclude, study similarly recommends: • Strengthen scientific research of disaster nursing • Taking advantage of male nurses • Variety of training methods such as: simulation exercises, role play, movie watching, case discussions & practice skills.
Chen, Guinet & Ruiz	2015	• Hospital evacuation plan • Simulation Emergency management plan • The evacuation times • The resource dimensioning	The main goals of this study were to estimate, formalize the evacuation process & to shorten evacuation time and optimize dimensioning of the resource. Study concentrated mainly on the evacuation time for non-walking clients, assessment of the system sensibility with respect to number of nurses, ambulances as well as traveling. "Simio" computer simulation was used to build up detail model & it was divided into 2 sub-models; the evacuation preparation & the decisional processes. Both were synchronized by specific trigger events. This study used "2k factorial experiment". It is an experiment that considers independent variables. Just 2 values were considered for each variable; a low & a high value. There were 4 factors for the proposed 2k factorial design: the

			number of; nurses (N), coordinators (C), ambulances (A), & stretchers' teams (S), which leads to 16 (2k = 24) different combinations to be simulated. Based on table on variation, the most effective factor was the number of ambulances. However, it was observed that having 1 or 2 coordinators affects the evacuation time in a rather negligible manner. Another important observation was the interaction values, mostly between S & A, N & S, and N & A. Since all the interactions show a ''–'' sign, it was concluded that the best performance was obtained when S & A both take the same level, N & S take the same level, and N & A take the same level. In addition, it was observed that the amount of ambulances expands around 19% of the variation of the evacuation time. Around 16% & 13% of the variation of the evacuation time is due to the number of stretchers & nurses. The amount of coordinators accounts for only a fraction of the variation. In conclusion, the numbers of ambulances & stretchers were bottlenecks of the current system, an increment in their amount should lead to reduction in the evacuation time. Average evacuation time for the best scenario was 4.95h, which confirms the most likely evacuation time suggested by the hospitals managers.

Alim, Kawabata & Nakazawa	2015	• Preparedness & preventive measures • Nursing students & diplo-ma nursing students • In-class training • Indonesia	This study accessed the effectiveness of the training and drill based on 3 evaluation components: Pre-test & post-test evaluation to measure the degree of knowledge acquired in the training; observation to evaluate skills during the disaster drill; and interview to obtain participants' responses & feedbacks on both the training & drill. Trainers & instructors used for this study were nursing professionals from universities & hospitals who had experience in disaster, emergency & critical care. The pre-& post-test observed that diploma students, with no previous training experience, had a remarkably higher difference score (4.90) than groups who had previous training experience (3.30). Findings from observational studies shows that majority of students could respond to the scenarios of disaster drill & could perform procedures like; conducting of triage, health problems identification, performing initial treatment & safe transporting of patients to the healthcare facility. However, the mean score was lower for diploma students than those for undergraduate students. To conclude, the training and drill improved the knowledge and the ability of disaster preparedness in both undergraduate & diploma students though the extent of improvement is relative to previous training experience.

Alfred et al.	2015	• Disaster nursing • Disaster nursing Competence • Disaster Nursing Curriculum • Shelter • Nursing Education • Emergency preparedness	The two-main objectives in this article were; "an educational journey towards disaster nursing competencies: a curriculum in action & collaborative learning in community health nursing for emergency preparedness". The 1st part highlighted the knowledge, skills and preparedness needed to develop nursing competencies: • Curriculum development; emphasises both practical & educational guidance related to disaster nursing. It states how Simulation techniques allow students experienced what might seem difficult to replicate in the classroom or in a clinical setting. • Educational competencies for registered nurses responding to mass casualty. • American Association of Colleges of Nursing (AACN) essentials of baccalaureate and master's education. • American Red Cross disaster health and sheltering; enables students to become familiarise of their role in disaster response efforts & provides resources & facilitators for activities in classroom. • Essential undergraduate curricular elements for disaster preparedness: the community health faculty is most often responsible for teaching disaster nursing content. • The International Council of Nurses (ICN) framework for disaster nursing competencies is the most comprehensive document related to disaster nursing competence, it uses the management continuum (Prevention/Mitigation, Preparedness, Response, Recovery /Rehabilitation) as the organizing framework for developing nursing

			competencies. The 2nd phase of this article emphasized the effect of collaborative disaster simulation in multiple communities which served as a clinical experience for most nursing students, it described how simulation is yet another angle of collaborative emergency preparedness that can be used in preparing student nurses for their role in emergencies. More emphases were made on; • Developing a collaborative disaster simulation • Collaboration between universities • Collaboration with community agencies Finally, the article shows the importance of partnering with others to make better clinical experiences for nursing students and nurse educators. However, community and public health nurses serve as role models to students and faculty in their professional and community service activities.
Zapko et al.	2015	• Team work • Communication skills • Triage • Critical thinking	The simulation studies were based on paediatrics, geriatrics, obstetrics, medical/surgical, culture care, critical care, trauma/code & end-of-life care scenarios. Studies had tremendous impact on increase in self-confidence in patients care during a disaster as a direct result of this disaster drill. Also, participants said

		• Interdisciplinary	they had greater empathy for patients involved in the disaster. Finally, participants reported they learned by observing others. All participants agreed that the disaster drill simulation was a valuable learning experience and they appreciated being able to work with another health care discipline. It was observed that participants displayed prioritization of care, critical-thinking skills & clinical decision-making skills.
West et al.	2015	• Inter-professional education (IPE) activities • Inter-professional education collaborative (IPEC) • Disaster day	Investigating how well two IPE activities align with IPEC competencies was the primary purpose of this study. A checklist and an observation instrument were developed to evaluate how well IPE activities met IPEC competencies, working effectively with other disciplines is an essential skill for healthcare professionals. Disaster Day (DD) was analysed, a simulation exercise was established amongst participants from Nursing, Medicine & Pharmacy, & Inter-professional Healthcare Ethics (IPHCE), a course on ethical issues using "didactic sessions & case discussions" was introduced to medical, nursing & pharmacy students. Both activities seem to facilitate the development of IPE competencies, (DD) aligned less with IPHCE competencies than the IPEC course & IPEC competencies seem to be addressed more comprehensively. Finally, both DD

			and IPHCE facilitated the development of the IPEC competencies.
Monod, Voekt, Gisin, Gisin& Hoesli	2014	• Obstetrics • Simulation training • Team communication • Multi-disciplinary • Multi-professional	For this study, emphasis was on the influence of simulation training on 4 specific skills: handling of emergency situation, self-confidence, knowledge of algorithms & team communication. The outcome of the study shows that professional competency can be strengthened by Implementation of simulation training, study confirmed self-perceived competency with higher self-confidence, better handling of emergency situations and remembering the management of algorithm can be improved by simulation training. The participants found simulation training for obstetrical emergencies as a useful method to train as a team for the management of emergency situations & patient´s safety improvement. They strongly disagreed when asked if they would have rather train alone, they also disagreed when asked if they felt exposed and observed. Hence, they showed the positive impact of efficient communication skills, working in group as multi-professional. Study showed that with simulation training, self-perceived competency with higher self-confidence, better handling of emergency situations & remembering the management of algorithm can be improved.
ÖztekİN,	2014	• Disaster	This study compared undergraduate nursing students`(UNS) educational

Larson, Altun Uğraş& Yüksel		• Educational needs • Preparedness • Response • Undergraduate nursing students.	needs(EN) concerning disaster preparedness(DP) & response(R) from 1st to 4th year classes at three state universities: 1 state university in Miyazaki & 2 state universities in Istanbul. Study was based on question descriptive/comparative survey and its main goals were; • To explore UNS participation in and considerations of EN about DP&R lectures/courses • To compare UNS knowledge levels about DP&R and lectures/courses taken by them • To explore teaching methods & resources UNS prefer to use in course content in DP&R courses/lectures • To explore UNS considerations of issues that could be included in DP&R courses/lectures • To identify expected skills of UN gained from a DP&R course/lecture. It was found that, most students from Istanbul had some knowledge about disaster preparedness & response from courses at their universities while students from Miyazaki showed less. Study emphasised the importance of nursing interventions for the development of competencies in disaster situations were important topic to be included in course content (Istanbul, 90.4%; Miyazaki, 93.1%). However, the expectations of most student nurses on skills that could be gained from a disaster preparedness & response course/culture of

			disaster lecture were (Istanbul, 48.7% and Miyazaki, 34.5%). The participation of students from both cities in disaster preparedness & response courses seem positive. Similarly, this study emphasized the need to incorporate mass casualty care & disaster management skills into undergraduate nursing curricula in both cities.
Kulig et al.	2014	• Emergencies • Policy • Disasters • Nursing Re-search • Rural nursing • Rural communities.	Focus was on rural hospitals & rural nursing in this research, presumed educational needs & disaster preparedness required for rural settings. It highlighted how relevant it is to build strong communities as preventive measures in disaster situations. Six themes were discussed in full by the relevant WHO/ICN nursing competencies. The whole study was assessed based on the following domains; • Care of vulnerable populations domain; There should be special evacuation needs as rural areas do not have similar facilities nor the readily available personnel found in urban areas, there is therefore the need to escalate disaster preparedness by nurses & others. • Communication and information sharing domain; Communication issues. Studies highlighted the miscommunication between officials and the public, incorrect reports in the media, and the inability to keep the public up-to-date regarding the disaster situation. For rural communities to prepare, respond & recovery from disaster, it is imperative to have

			effective communication before, during and after the disaster. • Policy development and planning domain; External support requirements. Building trust is a vital component in accepting help from external source mostly during vulnerable time of recovery. Large influx of strangers can be intimidating, hence, there should be a balance needs. • Long-term individual, family and community recovery domain: division of groups within the community; 3 major groups emerge during the recovery phase affecting the interactions between individuals & the functioning of the community. The groups were; those who: (a) were insured or not insured; (b)experienced losses during the fire & those who did not; and (c) emotionally moved on or those who did not. However, there were sustained supports for individuals and families. Finally, the study emphasised that, disasters can be immensely reduced if people are well informed and motivated towards disaster prevention and resilience, and this requires the collection, compilation and dissemination of relevant information & knowledge on disasters. However, by enhancing & building resilience in communities, rural nurses can contribute immensely to reducing disaster risk.

Distelhorst & Wyss	2013	• community-based • nursing education • community health • home visit simulation.	Community nursing simulation was the basic focus of this study, its curriculum was based on the following themes; care of individuals in the community, care of aggregates in the community, care of vulnerable populations in the community & health of communities. It was expected that; the themes would coordinate easily with most community & public health nursing textbooks. However, amongst these themes, the scenarios were based in typical community health settings like; home health care, public health clinics, free clinics, school health, correctional facilities & occupational health. For student nurses to believe in the importance of simulation, it is vital for students to demonstrate some technical skills as they explore important community health concepts. Study observes that; in large scale simulation scenarios, there could be combination of simulation equipment and group role play to represent community-wide interventions, such as disaster management or mass immunization during a pandemic. Hence, using this overall framework of content, nursing faculty could provide the student with a more in-depth view of the community's health care needs. At the end of this study, Students reported the impact of simulation exercises which increased their self-confidence when they are approaching independent

			work in their actual community clinical experience. The study recommends more research on community-based simulation activities, including the role of debriefing and post-simulation exercises.
Kaplan, Connor, Ferranti, Holmes & Spencer	2012	• Disaster response • Emergency preparedness • Nursing education • Public health nursing • Simulation.	The outcome of this research shows that; 93% of the students reported that; the simulation exercise changed their perspective of respiratory disease transmission & 97% indicated they would change their selection of respiratory protection when challenged with these signs and symptoms in the future. In this study, there were 2 groups, a group participated in simulation & lab before their first clinical day and the other group only participated in lab. The simulation group showed a statistically significant decrease in stress level before their first experience in clinical practice. After simulation exercise, a survey was carried out with 8 questions, responses were based upon a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = no opinion, 2 = disagree, 1 = strongly disagree) and the outcome were tremendous. Mean scores of 4.65 were reported for the emergency preparedness disaster simulation (EPDS), increasing understanding of emergency preparedness and

			the EPDS is well organized. Finally, it was obvious that EPDS served as an important means for student exposure & preparedness to implement techniques used in disaster response & management.